The Claims:

1. A laser for generating light pulses at a selected operating wavelength or range of wavelengths and a selected fundamental repetition frequency comprising:

(a) one or more optical resonators or a closed optical path where a light pulse can build up over multiple round trips; wherein the one or more resonators or the closed optical path comprises one or more gain mediums and wherein the round trip path length is selected to give the selected fundamental repetition frequency;

(b) one or more pump light sources;

(c) one or more optical couplers for coupling pump light from the pump light source into the one or more gain mediums to provide optical gain at the selected operating wavlength or range of wavelengths;

(d) one or more nonlinear optical or saturable absorber elements or devices optically coupled with the one or more optical resonators or the closed optical path and

(e) one or more optical couplers for coupling light pulses out of the laser wherein one or more of the saturable absorber elements or devices comprise carbon nanotubes.

2. The laser of claim 1 further comprising a wavelength tuning element or devise optically coupled with the one or more optical resonators or the closed optical path.

3. The laser of claims 1 or 2 wherein the one or more nonlinear optical or saturable absorber elements or devices comprising carbon nanotubes is positioned within one of the one or more optical resonators or within the closed optical path.

4. The laser of claims 2 or 3 wherein the wavelength tuning element is positioned within one of the one or more optical resonators or within the closed optical path.

5. The laser of any of claims 1-4 wherein at least one of the non-linear optical or saturable absorber elements or devices comprising carbon nanotubes is a mode locker.

6. The laser of claim 5 wherein the mode locker element or device is an optical pulse-initiating, self-starting element or device.

7. The laser of any of claims 1-6 which is in a ring configuration

8. The laser of any of claims 1-6 which is in a linear resonator configuration.

9. The laser of any of claims 1-6 which is in a sigma configuration.

10. The laser of any of claims 1-6 which has a colliding pulse mode-locking (CPM) configuration employing carbon nanotubes as a mode locker to produce optical pulses.

11. The laser of any of claims 1-6 in a hybrid mode-locking configuration, which further comprises an active mode-locking device which cooperates with the saturable absorber to

produce optical pulses.

12. The laser of any of claims 1-6 further comprising one or more non-linear optical or saturable absorbers elements or devices which do not contain carbon nanotubes.

13. The laser of any of claims 1-6 which is passively Q-switched wherein the saturable absorber element or device is employed as a Q-spoiler.

14. The laser of any of claims 1-13 capable of generating optical pulses of length about 1 picosecond or less.

15. The laser of any of claims 1-13 capable of generating optical pulses of length about 10 femtosecond or less.

16. The laser of any of claims 1-13 capable of generating optical pulses of length about 1 femtosecond or less.

17. The laser of any of claims 1-13 capable of generating pulses having energy higher than about 35pJ per pulse or capable of generating pulses having a peak power higher than about 35 W.

18. The laser of any of claims 1-17 wherein the carbon nanotubes comprise single-walled carbon nanotubes (SWNT).

19. The laser of any of claims 1-17 wherein the carbon nanotubes consist essentially of carbon nanotubes.

20. The laser of any of claims 1-19 wherein the carbon nanotubes are provided in a layer less than or equal to about 10 microns in thickness.

21. The laser of any of claims 1-19 wherein the carbon nanotubes are provided in a layer less than or equal to about 1 micron in thickness.

22. The laser of any of claims 1-21 wherein the carbon nanotubes are provided in a layer the thickness of which is varied to adjust the mode-locking and Q-switching threshold optical energy.

23. The laser of any of claims 1-22 wherein the carbon nanotubes comprise 50% or more by weight of semiconductor carbon nanotubes.

24. The laser of any of claims 1-23 wherein the diameters of the carbon nanotubes are selected to exhibit an exciton absorption in the operating wavelength range of the laser.

25. The laser of any of claims 1-24 wherein the carbon nanotubes are provided in more than one layer.

26. A laser-mode locking element or device comprising one or more layers containing carbon nanotubes.

27. A laser Q-switching element or device comprising one or more layers containing carbon nanotubes.

28. The element or device of claims 26 or 27 wherein the carbon nanotubes are SWNTs.

29. The element or device of any of claims 26-28 wherein the diameter of the carbon nanotubes are selected absorb within a desired operating wavelength range.

30. The element or device of any of claims 26-28 wherein the carbon nanotubes are selected to have a range of different diameters to provide a wide operating bandwidth.

31. The element or device of any of claims 26-30 capable of operation in both bi-direction and uni-direction.

32. The element or device of any of claims 26-30 capable of operation in both reflection and transmission mode.

33. The device of any of claims 26-32 wherein the layer thickness of the carbon nanotubes is uniformly varied.

34. The element or device of any of claims 26-33 wherein the carbon nanotubes are provided in a layer the thickness of which is varied to adjust the mode-locking and/or Q-switching threshold optical energy.

35. The element or device of any of claims 26-34 wherein a layer of carbon nanotubes is provided on a substrate surface.

36. The element or device of claim 35 wherein the other face of the substrate is provided with an AR (anti-reflection) coating, a bandpass filter, or a half-mirror.

37. A pulsed laser comprising the element or device of any of claims 26-36.

38. A. waveguide which comprises a layer, film or coating comprising carbon nanotubes through which light passes.

39. The waveguide of claim 38 which is a ridge waveguide.

40. The waveguide of claim 38 which comprises an optical fiber or is an optical fiber.

41. A method for generating light pulses in a laser which comprises the step of providing mode locker which comprises carbon nanotubes and which is optically coupled to the resonator of the laser.

42. The method of claim 41 wherein the laser is a ring laser, a Fabry-Perot (FP) linear resonator configuration laser, a Sigma configuration laser, or a colliding pulse mode-locking (CPM) configuration laser.

43. The method of any of claims 41 or 42 further comprising the step of providing one or more saturable absorber devices which do not contain carbon nanotubes optically coupled at

least to the resonator of the laser.

44. A method for passively mode-locking a laser to generate short optical pulses which comprises the step of providing a mode locker comprising carbon nanotubes optically coupled to the resonator of the laser as a mode-locking device wherein the optical pulses can be <5picosec, <2 picosec, <1 picosec, <500femtosec, < 100 femtosec, <50 femtosec, or <10femtosec in length.

45. A method for passively Q-switch a laser to generate high energy pulses, which comprises the step of providing a mode locker comprising carbon nanotubes optically coupled to the resonator of the laser as a Q-spoiler.

46. A method for generating optical pulses in a laser which comprises the step of mode-locking a laser of claim 1.

47. A method for generating optical pulses in a laser which comprises the step of Q-switching a laser of claim 1.